EMC TEST REPORT

Project No.	**LBE081274**	**Revision No.**	NONE
Applicant	**Name of organization**	Samsung Electronics Co., Ltd.	
	Address	416 Maetan 3-Dong,Yeongtong-Gu,Suwon-Si, Gyeonggi-Do, 443-742 Korea	
	Date of application	2008.04.11	
EUT Equipment Under Test	**Kind of product**	**SYSTEM Keyboard**	
	Model No.	**SSC-5000**	
		Variant Model No.	None
	Manufacturer	KEVIS Inc #803, 104 SK Ventium, 522, Dangjeong-Dong, Gunpo-Si, Gyunggi-Do, Korea 435-776	
Applied Standards		EN61000-6-4:2001	
		EN61000-3-2:2000+A2:2005	
		EN61000-3-3:1995+A2:2005	
		EN50130-4:1995+A2:2003	
Test Period		2008-04-15 ~ 19	
Issue date		2007.04.22	

Test result : **Complied**

The equipment under test has found to be compliant with the applied standards.
(Refer to the attached test result for more detail.)

Tested by : Tae Young, Jang

Reviewed by : No Cheon, Park

This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.
The test results in this report only apply to the tested sample. This report must not be reproduced, except in full, without written permission from SEC EMC Laboratory.

SAMSUNG

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Table of contents

1. Summary of test results
1.1 Emission
1.2 Immunity

2. General Information
2.1 Test facility
2.2 Accreditation and listing
2.3 EUT Description

3. Test configuration
3.1 Test Peripherals
3.2 EUT operating mode
3.3 Details of Sampling
3.4 Used cable description
3.5 EUT Description
3.6 Performance Criteria
3.7 Measurement uncertainty

4. Result of individual tests
4.1 Conducted disturbance
4.2 Radiated disturbance
4.3 Harmonics current
4.4 Voltage fluctuation & Flicker
4.5 Electrostatic discharge
4.6 Radiated, radio-frequency, electromagnetic field
4.7 Electrical fast transient/burst
4.8 Surge
4.9 Conducted disturbances, induced by radio-frequency fields
4.10 Voltage dips, short interruptions and voltage variations

Appendix – EUT photography

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1. Summary of test results

1.1 Emission

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Result	Remarks
☒	Conducted Disturbance (Mains Port)	EN61000-6-4:2001	Complied	Minimum margin is 36.3 dB at 0.162 MHz
☒	Radiated Disturbance		Complied	Minimum margin is 5.2 dB at 497.859 MHz
☒	Harmonics current	EN61000-3-2:2000	N/A	The power of EUT is below 75W
☒	Voltage fluctuation & Flicker	EN61000-3-3:1995+ A1:2001	Complied	Meets the Requirements

1.2 Immunity

The EUT has been tested according to the following specifications:

Applied	Test type	Applied standard	Performance Criterion	
			Result	Specification
☒	Electrostatic discharge	EN61000-4-2:1995	A☒ B☐ C☐	**B**
☒	Radiated, radio-frequency, electromagnetic field	EN61000-4-3:1995	A☐ B☒ C☐	**C**
☒	Electrical fast transient/burst	EN61000-4-4:1995	A☒ B☐ C☐	**B**
☒	Surge	EN61000-4-5:1995	A☒ B☐ C☐	**B**
☒	Radio-frequency conducted	EN61000-4-6:1996	A☐ B☒ C☐	**C**
☒	Voltage dips, short interruptions and voltage variations	EN61000-4-11:1994	A☒ B☐ C☐	B : 30%,60%, 100%Reduction A : Voltage 10% Up Voltage 15% Down
			A☒ B☐ C☐	
			A☐ B☒ C☐	
☐	Power-frequency magnetic field	EN61000-4-8:1993	A☐ B☐ C☐	**A**

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2. General Information

2.1 Test facility

The SEC EMC Laboratory is located on Samsung Electronics Co., Ltd. at 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, South Korea.
All testing are performed in Semi-anechoic chambers conforming to the site attenuation Characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms.

The SEC EMC Laboratory is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	KOLAS(Korea Laboratory Accreditation Scheme)	Accredited : 124
	Radio Research Laboratory	Accredited : KR0004
	FCC(Federal Communications Commission)	Accredited : KR0004
	National Voluntary Laboratory Accreditation Program	Lab Code: 200623-0
	Norges Elektriske Materiellkontroll	Accredited : ELA 195
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	C-2421,R-2224
	China Quality Certification Center	5-053, 5-054
	TUV Rhineland	H9354285
	GOST(GOSTSTANDART)	ROSTEST
	Elektrotechnicky Zkusebni Ustav	Reg. No.: 001
	IC(Industry Canada)	Assigned Code: 5871

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3. Test Setup configuration

3.1 Test Peripherals

The cables used for these peripherals are either permanently attached by the peripheral manufacturer or coupled with an assigned cable as defined below.
The following is a listing of the EUT and peripherals utilized during the performance of EMC test:

Description	Model No.	Serial No.	Manufacturer	Cable Type
System Keyboard	SCC-5000	-	Samsung	-
AC adapter	LSE0107A1230	-	LI SHIN	-
CCTV Camera	SCC-C4201	-	Samsung	-
YK-12060K	LN22A450	-	Samsung	-

3.2 EUT operating mode

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	CCTV Controlling

3.3 Details of Sampling

Customer selected, single unit.

3.4 Used cable description

The EUT is configured, installed, arranged and operated in a manner consistent with typical applications. Interface cables/loads/devices are connected to at least one of each type of interface port of the EUT, and where practical, each cable shall be terminated in a device typical of actual usage. The type(s) of interconnecting cables to be used and the interface port (of the EUT) to which these were connected;

No.	From the port of EUT	To	Length[m]	NOTE
1	DC in	AC adapter	1.5	No
2	Video out	TV Monitor	1.0	No
3	RS-485	CCTV Camera	1.5	No

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3.5 EUT Description

The following features describe EUT represented by this report:

Model Name	SSC-5000
INTERFACE(RS-485)	CONNECTOR TYPE : 8P TERMINAL TYPE
	PORT : 2 PORT
	BAUD RATE : 1200 / 2400 / 4800 / 9600 / 19200 / 38400 bps
TFT LCD PANEL	4.3" TFT LCD PANEL + TOUCH PANEL
	EFFECTIVE DISPLAY AREA : 95.040mm[H] x 53.856mm[V]
	NUMBER OF DOTS : 1440[H] x 272[V]
	DOT PITCH : 66.0 ㎛[H] x 198.0 ㎛[V]
USB PORT (USB 2.0)	S/W Upgrade
VIDEO INPUT/OUTPUT	Composite Video 1.0Vp-p, 75ohm, BNC Type, Loop Through out
OSD	Cze/Tur/Chi/Jpa/Bra(Port)/Neth/Denma/Croatia)
MULTI PROTOCOL(CAMERA)	Pelco-D, Pelco-P, Vicon, Panasonic, GE-Khalatel, Diamond,
	American Dynamic,Philips,Erna,VCLTP,Samsung Electronics ,Honeywell,Techwin
JOY STICK	3D JOY STICK (PAN/TILT/ZOOM)
LED	MONITOR, CAMERA, DVR
PAN/TILT & LENS CONTROL	PAN : LEFT / RIGHT
	TILT : UP / DOWN
	IRIS : CLOSE / OPEN
	FOCUS : FAR / NEAR
	ZOOM : TELE / WIDE
	PRESET, PATTERN, AUTO PAN, SCAN
	AUX1, AUX2, AUX3, AUX4
DVR CONTROL	Target : SAMSUNG DVR
	SW : RW, STOP, PLAY, FF, REC
	JOG/SHUTTLE : FORWARD/REVERSE, PLAY/REVERSE PLAY/FF/RW
POWER	DC 12V
POWER CONSUMPTION	4W
OPERATION TERPERATURE	0℃ ~ 40℃
OPERATION HUMIDITY RANGE	0 ~ 90%
DIMENSIONS(WxHxD)	496 x 197 x 282

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3.6 Performance Criteria

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention.
No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.
During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.
Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3.7 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4 and UKAS Lab 34.)

3.7.1 Emission

Test type		Measurement uncertainty (C.L. 95 %, k = 2)
Conducted disturbance		± 2.8 dB
Radiated Disturbance	**± 4.82 dB**	± 4.82 dB
	± 5.42 dB	± 5.42 dB

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4. Results of individual test

4.1 Conducted disturbance

Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration. The EUT measured in accordance with the methods described in Clause 9.

Limits for conducted disturbance at the mains ports of class A ITE

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60
NOTE The lower limit shall apply at the transition frequency		

Limits for conducted disturbance at the mains ports of class B ITE

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequency NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

4.1.1 Test instrumentation

Test instrumentation used in the Conducted disturbance test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Field Strength meter	ESCI	R&S	100368	2007-06-01	12
L.I.S.N (For EUT)	ENV216	R&S	100116	2007-09-13	12
Test Software	EMC32	R&S	Ver 5.20.2	N/A	N/A

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4.1.2 Photograph of the test Configuration

(Front)

(Rear)

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4.1.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	22.3 ℃	**Relative humidity**	33 %	**Atmospheric Pressure**	101.5 KPa
Test place	Shielded Room #1					
Note	* QP : Quasi-peak, AV: Average * Result = Level(QP or AV) + Corr. (LISN Insertion loss + Cable loss – Amplifier Gain) * Margin = Limit - Level					

Hardware Setup: Voltage with ENV 2-Line-LISN - [EMI conducted]

Subrange 1

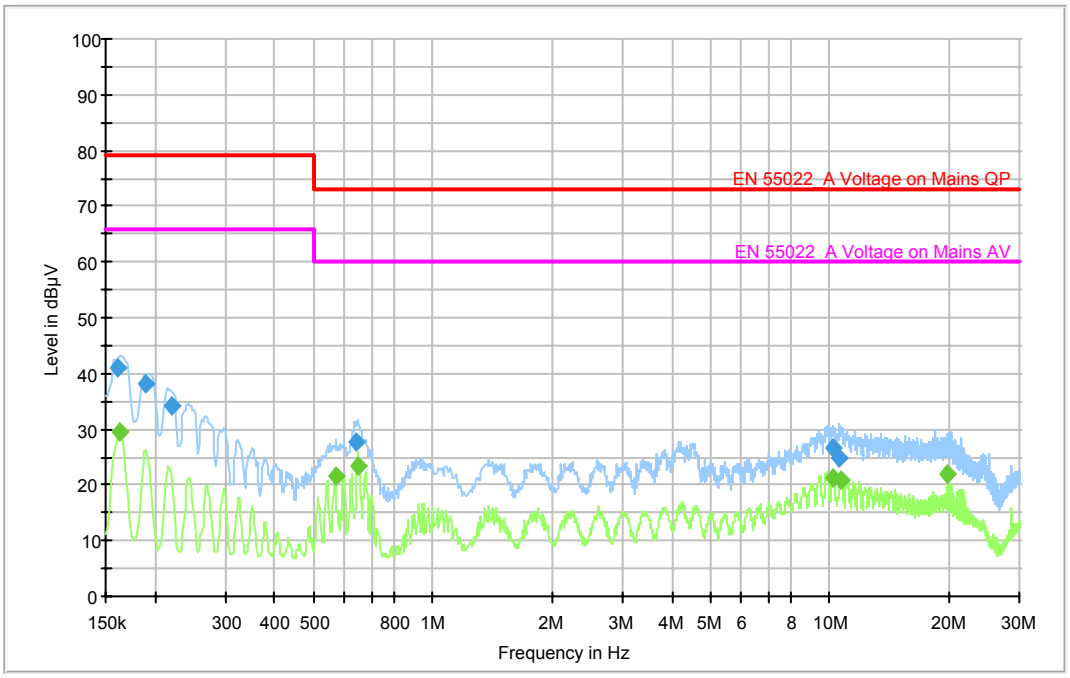
Frequency Range:	150kHz - 30MHz
Receiver:	ESCI 3
Transducer:	ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN55022_A_ENV 2-Line-LISN fin [EMI conducted]

Hardware Setup:	Voltage with ENV 2-Line-LISN
Level Unit:	dB μ V

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
150kHz - 30MHz	QuasiPeak; Average	9kHz	5s	ESCI 3

EN55022_A with ENV 2-Line-LISN



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Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.161 500	41.1	L1	9.6	37.9	79.0
0.189 500	38.0	L1	9.6	41.0	79.0
0.219 500	34.2	L1	9.6	44.8	79.0
0.643 500	27.8	L1	9.7	45.2	73.0
10.178 500	26.7	L1	9.9	46.3	73.0
10.513 500	24.8	L1	9.9	48.2	73.0

Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.162 500	29.7	N	9.6	36.3	66.0
0.568 500	21.6	N	9.6	38.4	60.0
0.647 500	23.3	N	9.6	36.7	60.0
10.191 500	21.2	L1	9.9	38.8	60.0
10.653 500	21.0	N	9.9	39.0	60.0
19.710 500	21.8	N	10.2	38.2	60.0

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4.2 Radiated disturbance

Of those disturbances above (*L* - 20dB), where *L* is the limit level in logarithmic units, record at least the disturbance levels and the frequencies of the six highest disturbances.
The following data lists the significant emission frequencies, measured levels, correction factors (for antenna and cables), orientation of table, polarization and height of antenna, the corrected reading, the limit, and the amount of margin. All measurements were taken utilizing quasi-peak detection unless stated otherwise. Measurements were performed at an antenna to EUT distance of 10 meters and elevated between 1 and 4 meters. Both vertical and horizontal antenna polarizations were measured.

Limits for radiated disturbance of ITE at a measuring distance of 10 m

Frequency range Limits MHz	Quasi-peak Limits dB dB(μV/m)	
	Class A	Class B
30 to 230	40	30
230 to 30	47	37
NOTE 1 The lower limit shall apply at the transition frequency NOTE 2 Additional provisions may be required for cases where interference occurs.		

4.2.1 Test instrumentation

Test instrumentation used in the Radiated disturbance was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
EMI Test Receiver	ESI-26	R&S	836092/002	2008-03-18	12
EMI Test Receiver	ESI-26	R&S	100147	2007-06-15	12
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Mast Controller	CO2000	inn-co	-	N/A	N/A
Mast Controller	CO2000	inn-co	-	N/A	N/A
Amplifier	310N	SONOMA	251674	2008-03-13	12
Amplifier	310N	SONOMA	186467	2008-04-01	12
RF selector	NS4900	TOYO	-	N/A	N/A
Bi-log Antenna	CBL6112D	SCHAFFNER	22603	2007-04-02	24
Bi-log Antenna	CBL6112D	SCHAFFNER	22604	2006-06-26	24

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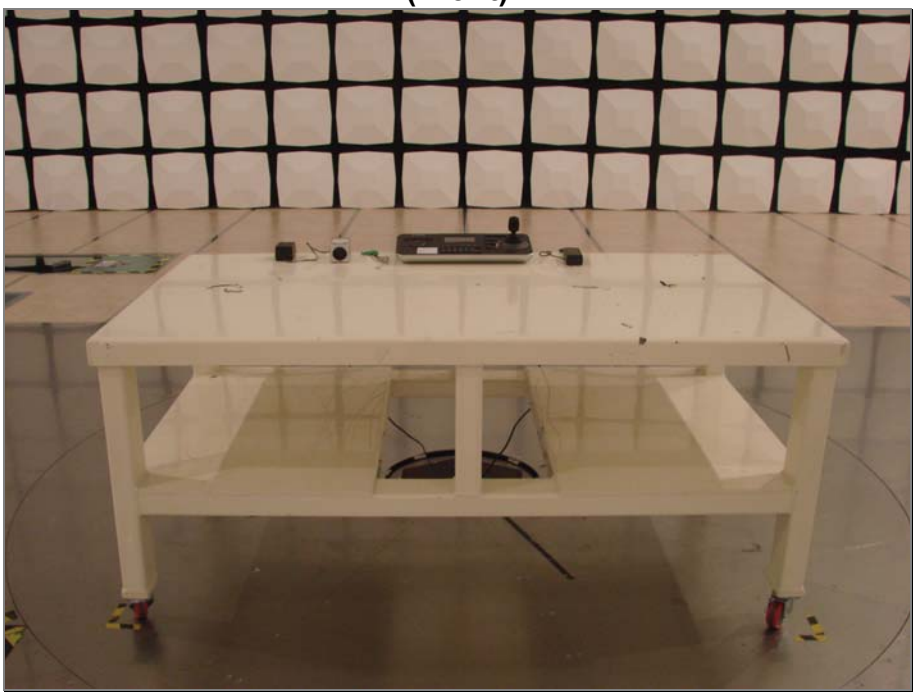
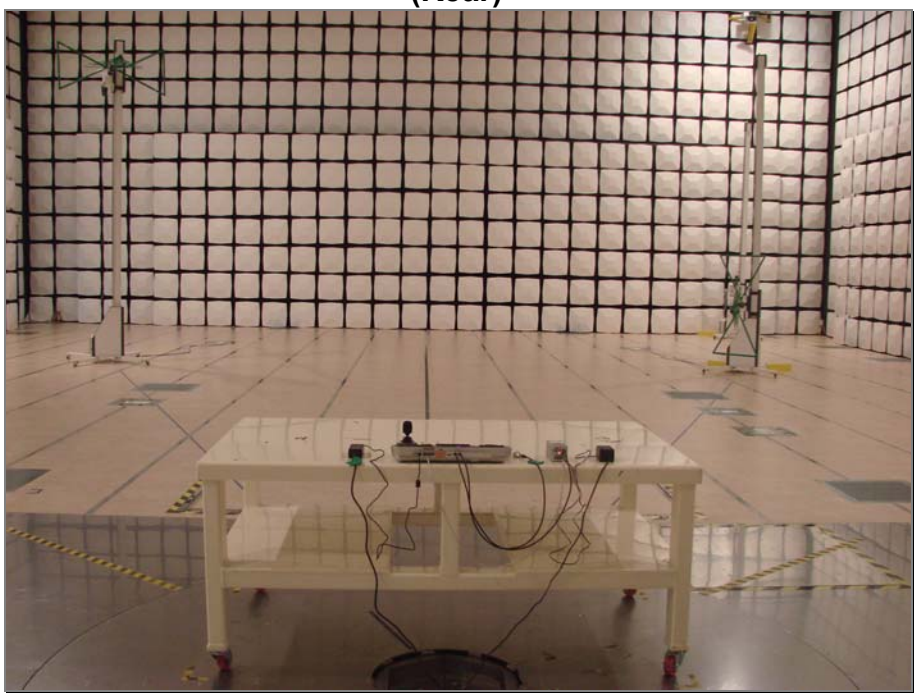
4.2.2 Photograph of the test Configuration

(Front)



(Rear)



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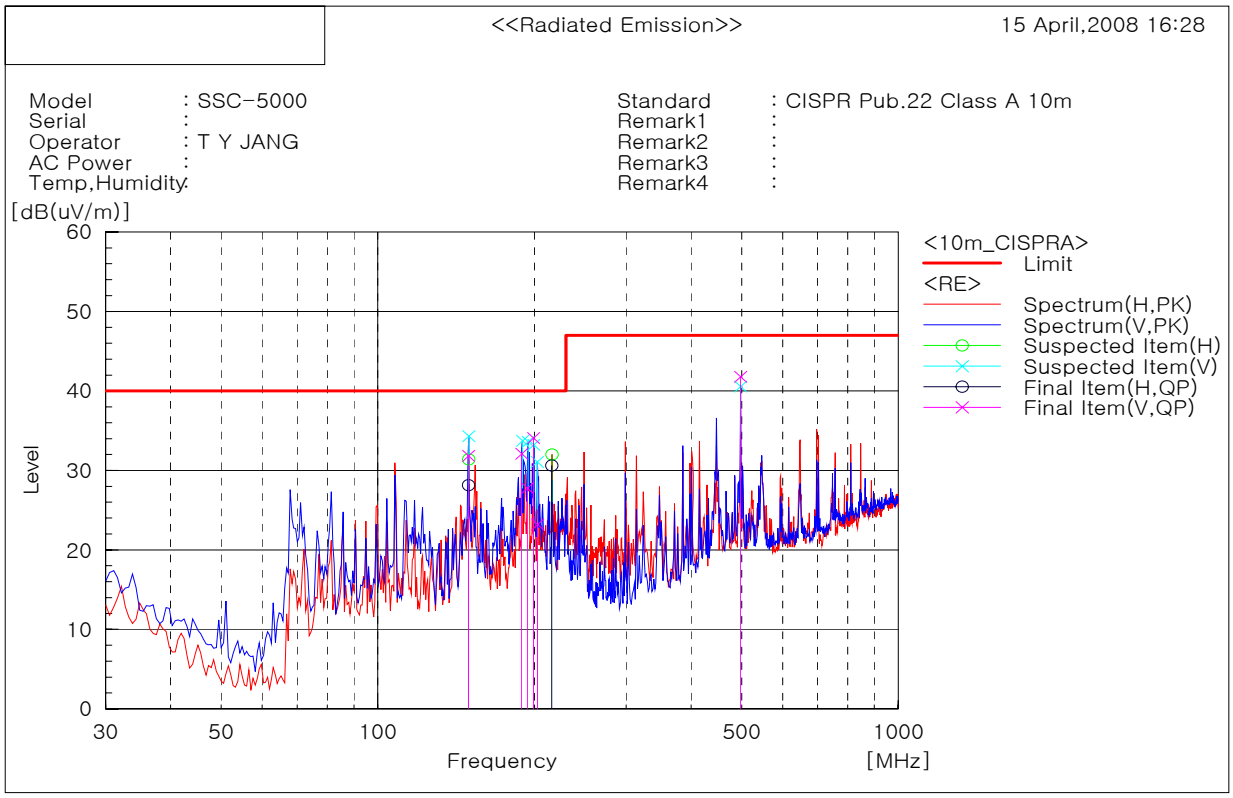
4.2.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-15		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	22.1℃	**Relative humidity**	33%	**Atmospheric Pressure**	100 kPa
Test place	10m Semi-Anechoic Chamber					
Note	* Test distance : 10 m * Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain) * Margin = Limit – Result					



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	149.338	47.1	-19.0	28.1	40.0	11.9	
2	215.989	49.7	-19.1	30.6	40.0	9.4	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(uV)]	c.f [dB(1/m)]	Result [dB(uV/m)]	Limit [dB(uV/m)]	Margin [dB]	Remark
1	149.355	50.4	-18.5	31.9	40.0	8.1	
2	188.989	51.5	-19.4	32.1	40.0	7.9	
3	193.734	47.0	-19.2	27.8	40.0	12.2	
4	199.156	53.1	-19.0	34.1	40.0	5.9	
5	202.781	42.3	-19.1	23.2	40.0	16.8	
6	497.859	50.7	-8.9	41.8	47.0	5.2	

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4.3 Harmonics current

The EUT operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
The power consumption, steady state harmonic currents were measured in the tested operating mode(s).
The EUT measured in accordance with the test conditions described in Annex C (C.10).

Limits for Class A equipment

Harmonic order n	Maximum permissible harmonic current A
Odd Harmonics	
3 **5** **7** **9** **11** **13** **15≤ n≤ 39**	**2,30** **1,14** **0,77** **0,40** **0,30** **0,21** **0,15 15/n**
Even harmonics	
2 **4** **6** **8≤ n≤ 40**	**1,08** **0,43** **0,30** **0,23 8/n**

4.3.1 Test instrumentation

Test instrumentation used in the Harmonics current test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Power Analyzer	PM6000	Voltech	100006700167	2007-10-12	12
IEC Network	555	ZIMMER	IB10/9466	N/A	N/A

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4.3.2 Photograph of the test Configuration

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4.3.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	24.3℃	**Relative humidity**	37%	**Atmospheric Pressure**	101.4 kPa
Test place	Shielded Room #3					

Product:	CCTV CAMERA	2008 Apr 18 9:42pm
Serial no:		Page 1 of 1
Description:		
Test Date:	2008 Apr 18 9:37pm	
Result Name:	SSC-5000	
Type of Test:	EN61000:2006 Harmonics inc. interharmonics to EN61000-4-7:2002	
Limits:	Class A	
Power Analyzer:	Voltech PM6000 v1.18.05RC3 s/n 100006700167	
AC Source:	Mains / Manual Source	

Harmonic Results Against Chosen Limits:	**Notes:**
N/A	Minimum power is greater than maximum

Test Parameter Details	**User Entered**	**Measured**
Operating Frequency:	50	49.9840
Operating Voltage:	230	230.6357
Specified Power:	0.0000	3.6310
Fundamental Current:	0.0000	0.0270
Power Factor:	0.0000	0.3395
Average Input Current:		0.0463
Maximum POHC:		0.0159
POHC Limit:		0.2514
Maximum THC:		0.0379
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	00:02:30	

*** This EUT doesn't need to be tested because the power of EUT is below 75 W.**

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4.4 Voltage fluctuation & Flicker

The EUT operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
During the flicker measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes.

Limits of voltage fluctuations and flicker at the supply terminals

short-term flicker indicator, Pst	the relative steady-state voltage change, dc	the value of *d(t)* during a voltage change, d(t) >3.3 %	the maximum relative voltage change, dmax
1.0	**3.3 %**	**500 ms**	**4 %**

4.4.1 Test instrumentation

Test instrumentation used in the Voltage fluctuation & Flicker test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Power Analyzer	PM6000	Voltech	100006700167	2007-10-12	12
IEC Network	555	ZIMMER	IB10/9466	N/A	N/A

4.4.2 Photograph of the test Configuration

Is Same the Harmonic current test photograph.

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4.4.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	24.3℃	**Relative humidity**	37%	**Atmospheric Pressure**	101.4 kPa
Test place	Shielded Room #3					

Product: Serial no: Description: Result Name:	CCTV CAMERA SSC-5000	2008 Apr 18 9:58pm Page 1 of 1
Voltech IEC61000-3 Windows Software 1.08.03RC1	Test Date:	2008 Apr 18 9:46pm
Type of Test: Power Analyzer: AC Source:	Flickermeter Test - Table Voltech PM6000 v1.18.05RC3 s/n 100006700167 Mains / Manual Source	
Overall Result: **PASS**	Notes: Measurement method - Voltage	

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.149	0.002	0.027	0

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4.5 Electrostatic discharge

Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points are subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane.
The remaining three test points are each receive at least 50 direct contact discharges.

If no direct contact test points are available, then at least 200 indirect discharges be applied in the indirect mode. Test is performed at a maximum repetition rate of one discharge per second.

Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur.
Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user.

A minimum of 10 single air discharges shall be applied to the selected test point for each such area. The EUT was tested with all I/O ports exercised. Test results are listed below.
The basic test procedure was in accordance with IEC 61000-4-2.

Performance criteria

Application of discharge	Test specification (kV)	Performance criteria
Contact discharge	**6**	**B**
Air Discharge	**8**	**B**

4.5.1 Test instrumentation

Test instrumentation used in the Electrostatic discharge test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
ESD Gun	NSG435	Schaffner	001506	2008-03-27	12
Vertical Plane	VCP-1	Thermo Keytek	-	-	-

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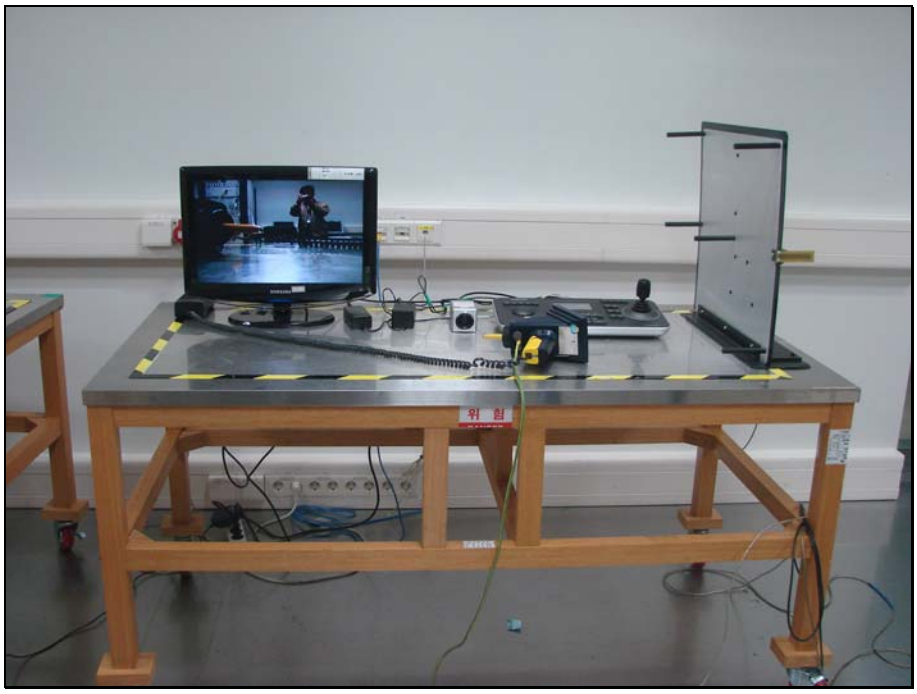
4.5.2 Photograph of the test Configuration



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4.5.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	24.3℃	**Relative humidity**	37%	**Atmospheric Pressure**	101.4 KPa
Test place	Shielded Room #3					

Test Method	No	Applied Point	Discharge Method	Test Level(KV)	Observation [Note No.]	Test Result
Indirect	-	HCP	Contact	±2☒ ±4☒ ±6☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
		VCP	Contact	±2☒ ±4☒ ±6☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	1	LCD	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	2	Button	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	3	Jog Shuttle	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	4	Joy-stick	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	5	DC IN	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	6	RS-485	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐
Direct	7	Video In/Out	Air	±2☒ ±4☒ ±8☒	**Note 1**☒ **2**☐	A☒ B☐ C☐

NOTE
1. There was no change compared with initial operation during the test.
2. While the electrostatic discharge tests, malfunction appeared in normal operate, but self-recoverable after the test.

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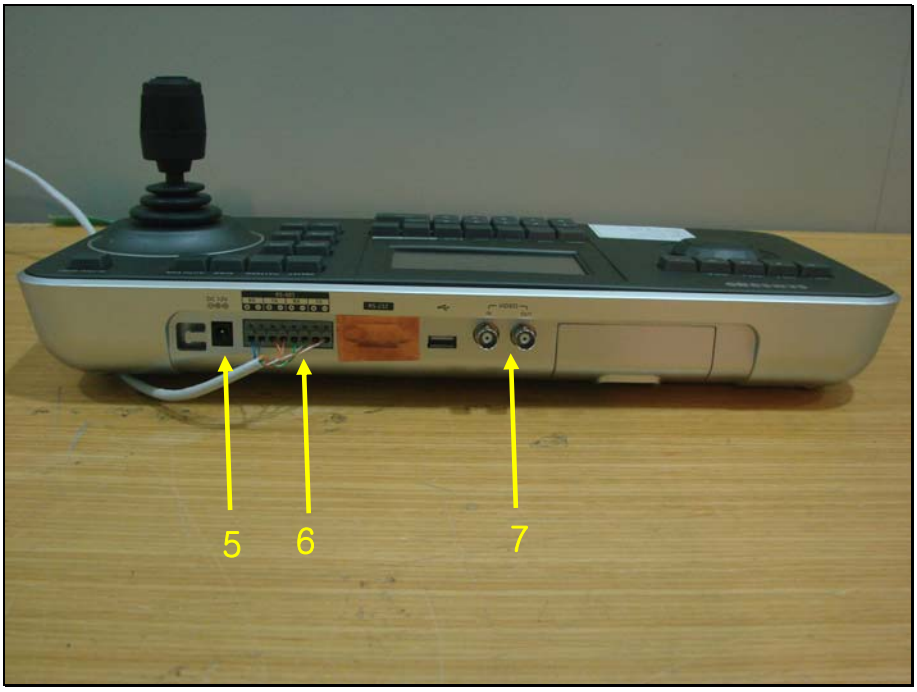
4.5.4 Tested points

Air discharge points	Contact discharge points	Air/Contact discharge points

■ **Front**

■ **Rear**



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4.6 Radiated, radio-frequency, electromagnetic field

The test was performed with the EUT exposed to both vertically and horizontally polarized fields. on each of the four sides.
The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond. The basic test procedure was in accordance with IEC 61000-4-3.

Performance criteria

Test range [MHz]	Test specification	Performance criteria	Remarks
80~2000	10V/m 80% AM (1KHz) 10V/m 80% PM (1KHz)	C	The test level specified is prior to modulation
	3V/m 80% AM (1KHz) 3V/m 80% PM (1KHz)	B	The test level specified is prior to modulation
	1V/m 80% AM (1KHz) 1V/m 80% PM (1KHz)	A	The test level specified is prior to modulation

4.6.1 Test conditions

Test condition in the Radiated, radio-frequency, and electromagnetic field test was as follows:

1. Representative operating conditions of EUT	CCTV Controlling	
2. Type of the EUT	☒ **Table-top**	☐ **a combination of the two**
	☐ **Floor-standing**	**a height above the ground plane;** ☐ **0.1 m** ☐ **0.8 m**
3. Type of test facility	3m Fully anechoic chamber	
4. Position of the radiating antennas	a distance of 3 meters from the EUT	
5. Type of antennas	Log-periodic	
6. Frequency sweep rate	1.5 x 10-3 decades/s	
7. Dwell time and frequency steps	Dwell time : 3 s, Step size : 1 %	
8. Applied test level	1V/m, 3V/m, 10V/m	

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4.6.2 Test instrumentation

Test instrumentation used in the Radiated, radio-frequency, and electromagnetic field test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval
10V Insertion Unit	URV5-Z4	R&S	395.1019.55	2008-03-05	12
10V Insertion Unit	URV5-Z4	R&S	395.1619.55	2008-03-05	12
Signal Generator	SML03	R&S	102191	2007-09-07	12
Mill volt Meter	URVD	R&S	841501/010	2008-03-05	12
Amplifier	250W1000A	AR	312241	N/A	N/A
Amplifier	60SIG3	AR	311853	N/A	N/A
Antenna	AT1080	AR	310700	N/A	N/A
Antenna Mast	TP1000A	AR	311200	N/A	N/A
Relay Switching Unit	TS-RSP	AR	-	N/A	N/A

4.6.2 Photograph of the test Configuration

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4.6.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-19		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	21.5℃	**Relative humidity**	33%	**Atmospheric Pressure**	101.5KPa
Test place	3m Fully Anechoic Chamber					

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	10V/m 80% AM	0	Horizontal	See Note 1	A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% AM	90	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% AM	180	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% AM	270	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	3V/m 80% AM	0	Horizontal	See Note 2	A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% AM	90	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% AM	180	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% AM	270	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐

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Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	1V/m 80% AM	0	Horizontal	See Note 2	A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% AM	90	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% AM	180	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% AM	270	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	10V/m 80% PM	0	Horizontal	See Note 1	A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% PM	90	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% PM	180	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐
80~2000	10V/m 80% PM	270	Horizontal		A ☐ B ☒ C ☐
			Vertical		A ☐ B ☒ C ☐

Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	3V/m 80% PM	0	Horizontal	See Note 2	A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% PM	90	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% PM	180	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	3V/m 80% PM	270	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐

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Frequency [MHz]	Test Level [V/m]	Table Azimuth [degree]	Polarity	Observation	Test Result
80~2000	1V/m 80% PM	0	Horizontal	See Note 2	A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% PM	90	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% PM	180	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐
80~2000	1V/m 80% PM	270	Horizontal		A ☒ B ☐ C ☐
			Vertical		A ☒ B ☐ C ☐

Note
1. EUT was turned off during the test, and recovered by operator's handling.
2. There was no change compared with initial operation during the test.

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4.7 Electrical fast transient/burst

■ Test on power supply ports and on protective earth terminals

Stationary, floor-mounted equipment

The test voltage applied between a reference ground plane and each of the power supply terminals, a.c. or d.c., and on the terminal for the protective or function earth on the cabinet of the EUT.
The EFT/B-generator shall be located on the reference plane.
The length of the “hot wire” from the coaxial output of the EFT/B-generator to the terminals on the EUT is not exceeding 1 m. This connection was unshielded but well insulated.
All other connections of the EUT are in accordance with its functional requirements.

Non-stationary mounted EUT, connected to the mains supply by flexible cord and plugs

The test voltage is applied between each of the power supply conductors and the protective earth at the power supply outlet to which the EUT is to be connected.

■ Test on I/O and communication ports

As far as possible, the capacitive coupling clamp is used for coupling the test voltage into the lines. However, if the clamp cannot be used due to mechanical problems (size, cable routing) in the cabling, it may be replaced by a tape or a conductive foil enveloping the lines under test. The capacitance of this coupling arrangement with foil or tape is equivalent to that of the standard coupling clamp.

In other cases, it is useful to couple the EFT/B-generator to the terminals of the lines via discrete 100 pF capacitors instead of the distributed capacitance of the clamp or of the foil or tape arrangement.

All tests carried out in shielded room.
The EUT was tested with all I/O ports exercised. Test results are listed below.

Performance criteria

Applied conditions	Test specification	Performance criteria
Open-circuit output test voltage		**B**
a.c. power ports	**2 kV(Peak)**	
signal and telecommunication ports	**1 kV(Peak)**	
d.c. power ports	**1 kV(Peak)**	
Wave shape of the pulse	**5/50 Tr/Th ns**	
Repetition Frequency	**5 kHz**	

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4.7.1 Test conditions

Test condition in the Electrical fast transient/burst immunity test was as follows:

1. Representative operating conditions of the EUT		CCTV Controlling
2. the Type of the EUT	☒ **Stationary, floor-mounted equipment**	
	☐ **Non-stationary mounted EUT**	
3. the type of test facility		Shielded Room #2
4. Test level		☐ **0.5 kV** ☐ **1 kV** ☒ **2 kV**
5. Polarity of the test voltage		☒ **Positive** ☒ **Negative**
6. Duration of the test		18 min
7. EUT's ports to be tested	**a.c. power ports**	☒ **Live** ☒ **Neutral** ☒ **Live + Neutral** ☐ **Live + PE** ☐ **Neutral + PE** ☐ **Live + Neutral + PE**
	Others ports	☐ **I/O ports** ☐ **Communication ports** ☐ **d.c. power ports**

4.7.2 Test instrumentation

Test instrumentation used in the Electrical fast transient/burst test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
EFT/Burst Generator	PEFT4010	HAEFELY	152608	2007-05-16	12
3 Phase CDN 690V/100A	FP-EFT 100M	HAEFELY	152635	2007-05-16	12

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4.7.3 Photograph of the test Configuration

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4.7.4 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	22.0℃	**Relative humidity**	35%	**Atmospheric Pressure**	101.4KPa
Test place	Shielded Room #2					

Test Point		Polarity	Test Level (kV)	Phase wave Shapes & Repetitions	Observation [Note No.]	Test Result
a.c. power ports	Live	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	Neutral	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	PE (Ground)	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	Live + PE	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	Neutral + PE	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	Live + Neutral	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐
	Live + Neutral + PE	+/-	2	5/50ns, 5kHz	Note 1☒ 2☐	A ☒ B ☐

NOTE
1. There was no change compared with initial operation during the test.
2. The transmission of data was stopped during the test, but self-recoverable after the test.

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4.8 Surge

The basic test procedure was in accordance with IEC 61000-4-5.

Performance criteria

Applied conditions	Test specification	Performance criteria
Combination wave **a.c. power ports** **signal and telecommunication ports** **d.c. power ports**	**Line to Line 0.5,1 kV(Peak) ①** **Line to earth 0.5,1,2 kV(Peak) ①** **Line to ground 0.5,1kV(Peak) ②** **0.5,1 kV(Peak) ③**	**B**
Waveform parameter **Open-circuit voltage** **Short-circuit current**	**1.2/50 Tr/Th μs** **8/20 Tr/Th μs**	

① Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables. Where normal functioning cannot be achieved because of the impact of the CDN on the EUT, no test shall be required.

② When the manufacturer specifies protection measures and it is impractical to simulate these measures during the tests, then the applied test levels shall be reduced to 0,5 kV and 1 kV.

③ Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables.

4.8.1 Test instrumentation

Test instrumentation used in the Surge test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Surge Tester	PSURGE 8000	HAEFELY	152602	2008-01-23	12
Surge Impulse Module	PIM 100	HAEFELY	152288	2008-01-23	12
Coupling Decoupling Network	PCD 120	HAEFELY	148918	2008-01-23	12
Coupling Decoupling Network	FP-SURGE 100M	HAEFELY	152636	2008-01-23	12
Impulse Module	PIM 120	HAEFELY	150663	2008-01-30	12

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4.8.2 Test conditions

Test condition in the Surge immunity test was as follows:

1. Representative operating conditions of the EUT		CCTV Controlling
2. Type of LINE	☒ **EUT power supply**	
	☐ **unshielded asymmetrically operated interconnection lines**	
	☐ **unshielded symmetrically operated interconnection / telecommunication lines**	
	☐ **shielded lines**	
	☐ **potential differences**	
3. the type of test facility		Shielded Room #3
4. Test level		☒ **0.5 kV** ☒ **1 kV** ☐ **2 kV**
5. Polarity of the surge		☒ **Positive** ☒ **Negative**
6. Number of test(at selected points)		40
7. Repetition rate		60 **sec**
8. EUT's ports to be tested	**a.c. power ports**	☒ **Live + Neutral** ☒ **Live + PE** ☒ **Neutral + PE**
	others ports	☐ **I/O ports** ☐ **Communication ports** ☐ **d.c. power ports**

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4.8.3 Photograph of the test Configuration

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4.8.4 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	24.3℃	**Relative humidity**	37%	**Atmospheric Pressure**	101.4 KPa
Test place	Shielded Room #3					

Test Point		Polarity	Number of Surge	Test Level (kV)	Phase wave Shape [μs]	Observation [Note No.]	Test Result
a.c. power ports	Live + Neutral	+/-	20	0.5	1.2/50(8/20)	Note 1☒ 2☐	A ☒ B ☐
				1	1.2/50(8/20)	Note 1☒ 2☐	A ☒ B ☐

NOTE

1. There was no change compared with initial operation during the test.

2. The transmission of data was stopped during the test, but self-recoverable after the test.

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4.9 Conducted disturbances, induced by radio-frequency fields

The test was performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility. Test results are listed below.
The basic test procedure was in accordance with IEC 61000-4-6.

Performance criteria

Test range [MHz]	Test specification	Performance criteria	Remarks
0.15~100	10V/m 80% AM (1KHz) 10V/m 80% PM (1KHz)	C	See 1) , 2)
	3V/m 80% AM (1KHz) 3V/m 80% PM (1KHz)	B	See 1) , 2)
	1V/m 80% AM (1KHz) 1V/m 80% PM (1KHz)	A	See 1) , 2)

1) The frequency range is scanned as specified. However, when specified in Annex A, an additional comprehensive functional test shall be carried out at a limited number of frequencies. The selected frequencies for conducted tests are: 0,2; 1; 7,1; 13,56; 21; 27,12 and 40,68 MHz (±1 %).
2) Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3m.

4.9.1 Test conditions

Test condition in the Radiated, radio-frequency, and electromagnetic field test was as follows:

1. Representative operating conditions of EUT	CCTV Controlling	
2. Type of EUT' unit	☒ **Single**	☐ **Multiple**
3. Type of test facility used	Shielded room#2	
4. Frequency range of application the test	0.15 ~ 100 MHz	
5. Frequency sweep rate	1.5 x 10-3 decades/s	
6. Dwell time and frequency steps	Dwell time : 3 s, Step size : 1 %	
7. Applied test level	1 V/m , 3 V/m, 10 V/m	

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4.9.2 The positions of EUT's, AE(s), coupling and decoupling device

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4.9.3 Test instrumentation

Test instrumentation used in the Conducted disturbances, induced by radio-frequency fields test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval (Month)
RF - Generator	NSG2070	Schaffner	1118	2007-06-12	12
Attenuator	INA2070-1	Schaffner	2118	2008-03-06	N/A
Test Software	Win 2070	Schaffner	V01.05	N/A	N/A
Coupling Decoupling Network	CDN M016	Schaffner	20574	2007-05-11	12

4.9.4 Photograph of the test Configuration

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4.9.5 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	22.0℃	**Relative humidity**	35%	**Atmospheric Pressure**	101.4KPa
Test place	Shielded Room #2					

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	1V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☒B☐C☐
	1V/m 80% AM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	1V/m 80% AM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	3V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☒B☐C☐
	3V/m 80% AM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	3V/m 80% AM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	10V/m 80% AM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☐B☒C☐
	10V/m 80% AM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	10V/m 80% AM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

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Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	1V/m 80% PM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☒B☐C☐
	1V/m 80% PM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	1V/m 80% PM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	3V/m 80% PM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☒B☐C☐
	3V/m 80% PM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	3V/m 80% PM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

Frequency (MHz)	Field Strength (Vr.m.s.)	Injection Method	Inject Points (Cable length)	Observation [Note No.]	Test Result
0.15 ~ 100	10V/m 80% PM	CDN-M3	AC power line(1.8m)	Note 1☒ 2☐	A☐B☒C☐
	10V/m 80% PM	CDN-T4	LAN (10m)	Note 1☐ 2☐	A☐B☐C☐
	10V/m 80% PM	CDN-T2	Telephone (10m)	Note 1☐ 2☐	A☐B☐C☐

NOTE

1. There was no change compared with initial operation during the test.
2. The transmission of data from modem port stopped during the test, but self-recoverable after the test. This permissive loss of performance is specified by the manufacturer, and this phenomenon will be put as a clear statement in the User's Manual to avoid misunderstanding.

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4.10 Voltage dips, short interruptions and voltage variations

The EUT is tested for each selected combination of test levels and duration with a sequence of tree dips/interruptions with intervals of 10 s minimum (between each test event).
Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform. The basic test procedure was in accordance with IEC 61000-4-11.

Performance criteria

Environmental phenomenon	Test specification	Units	Performance criteria	Remarks
Voltage dips	30 0.5;1;5;10	% reduction periods	B	See NOTE
	60 0.5;1;5;10		B	
	100 0.5;1;5		B	
Voltage variations	10% Up 15% Down		A	
[NOTE] Changes to occur at 0 degree crossover point of the voltage waveform.				

4.10.1 Test instrumentation

Test instrumentation used in the Voltage dips, short interruptions and voltage variations test was as follows:

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				date	Interval (Month)
Voltage Dip & Interruption	☐ PFS 503	EM TEST	PFS503/63A -0513100236	2007-06-16	12
	☒ PLINE 1610	HAEFELY	083690-21	2007-05-16	12

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4.10.2 Photograph of the test Configuration

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4.10.3 Test results

Operating condition	CCTV Controlling					
Test date	2008-04-18		**Test engineer**		Tae Young, Jang	
Climate condition	**Ambient temperature**	22.0℃	**Relative humidity**	35%	**Atmospheric Pressure**	101.4 KPa
Test place	Shielded Room #2					

Voltage Dips/ Interference

Test Voltage	Period	Number of Applications	Angle [Degrees]	Observation [Note No.]	Test Result
Reduction 30%	0.5	10	0, 180	Note 1☒ 2☐	A ☒ B ☐ C ☐
	1	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
	5	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
	10	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
Reduction 60%	0.5	10	0, 180	Note 1☒ 2☐	A ☒ B ☐ C ☐
	1	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
	5	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
	10	10	0	Note 1☒ 2☐	A ☐ B ☒ C ☐
Reduction 100%	0.5	10	0,180	Note 1☒ 2☐	A ☒ B ☐ C ☐
	1	10	0	Note 1☒ 2☐	A ☒ B ☐ C ☐
	5	10	0	Note 1☒ 2☐	A ☐ B ☒ C ☐

Voltage Variations

Test Voltage	Time for decreasing voltage	Time at reduced voltage	Time at increasing voltage	Observation [Note No.]	Test Result
10% UP	2s	2s	2s	Note 1☒ 2☐	A ☒ B ☐ C ☐
15% DOWN	2s	2s	2s	Note 1☒ 2☐	A ☒ B ☐ C ☐

NOTE

1. **There was no change compared with initial operation during the test.**
2. **While The Voltage Dip & Interruption tests, malfunction appeared in normal operate, but self-recoverable after the test.**

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Appendix – EUT photography

Front

Rear

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